



NATIONAL PRIDE EQUIPMENT BOOSTER PUMP USER'S MANUAL



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NPE BOOSTER PUMP

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INTRODUCTION

This User's Manual outlines installation, operation, maintenance and troubleshooting details vital to the sustained performance of your system.

The test results which are included with this User's Manual indicate your system's permeate and concentrate test results.

If your system is altered at the site of operation or if the feed water conditions change, contact NPE to determine the proper recovery for your application.

NOTE: IN ORDER TO MAINTAIN THE MANUFACTURER WARRANTY, AN OPERATING LOG MUST BE MAINTAINED AND COPIES WILL NEED TO BE SENT TO NATIONAL PRIDE EQUIPMENT FOR REVIEW.

NOTE: PRIOR TO OPERATING OR SERVICING THE BOOSTER PUMP, THIS USER'S MANUAL MUST BE READ AND FULLY UNDERSTOOD.

NOTE: IT IS UNSAFE TO OPERATE OR SERVICE THIS DEVICE WITHOUT FIRST READING AND UNDERSTANDING THE ENTIRE USER'S MANUAL. KEEP THIS MANUAL AND OTHER ASSOCIATED DOCUMENTATION FOR FUTURE REFERENCE.

SAFETY

This Safety section of this User's Manual outlines the various safety headings used throughout this manual's text and are enhanced and defined below:

NOTE: INDICATES STATEMENTS THAT PROVIDE FURTHER INFORMATION AND CLARIFICATION.

CAUTION: INDICATES STATEMENTS THAT ARE USED TO IDENTIFY CONDITIONS OR PRACTICES THAT COULD RESULT IN EQUIPMENT OR ANY TYPE OF PROPERTY DAMAGE.

WARNING: INDICATES STATEMENTS THAT ARE USED TO IDENTIFY CONDITIONS OR PRACTICES THAT COULD RESULT IN INJURY OR LOSS OF LIFE. FAILURE TO FOLLOW WARNINGS COULD RESULT IN SERIOUS INJURY OR EVEN DEATH.

WARNING: DO NOT REMOVE ANY CAUTION, WARNING, OR OTHER DESCRIPTIVE LABELS FROM THE EQUIPMENT.

WARNING: DO NOT REMOVE ANY PAGES FROM THE SUPPLIED READING MANUALS OR OTHER INFORMATIONAL DOCUMENTS.

SAFETY

WARNING: EYE PROTECTION SHOULD BE WORN AT ALL TIMES WHEN OPERATING THE BOOSTER PUMP AS UNIT HAS HIGH PRESSURE WATER LINES.

WARNING: UNIT INSTALLATION MUST ADHERE TO ALL LOCAL ELECTRICAL AND PLUMBING CODES.

WARNING: ALL MAINTENANCE AND REPAIR ACTIONS ARE TO BE PERFORMED BY MAINTENANCE PERSONNEL WHO HAVE BEEN TRAINED AND FULLY READ THE DOCUMENTATION FOR ALL SYSTEM INFORMATION.

CAUTION: TO AVOID ANY ELECTRICAL SHOCK HAZARD, DO NOT OPERATE THIS DEVICE WHEN COVERS OR CONTROLLER ENCLOSURE IS OPENED.

CAUTION: ALL ELECTRICAL POWER MUST BE TURNED OFF AND THE LOCK OUT PROCEDURE MUST BE UTILIZED TO ENSURE ALL POWER IS SHUT OFF PRIOR TO SERVICING OR PERFORMING SYSTEM MAINTENANCE TO ANY PORTION OF THE EQUIPMENT.

CAUTION: DO NOT OPERATE THIS DEVICE IN AN EXPLOSIVE ENVIRONMENT OR IN THE PRESENCE OF FLAMMABLE MATERIALS.

WARNING: MOVEMENT OR VIBRATIONS DURING SHIPMENTS MAY CAUSE CONNECTIONS TO LOOSEN. PLEASE CHECK ALL CONNECTIONS PRIOR TO TURNING ON THE POWER.

WARNING: DO NOT OPERATE THIS UNIT IN ENVIRONMENTS WHERE TEMPERATURES MAY BE BELOW 40 DEGREES F OR ABOVE 90 DEGREES F.

WARNING: IMPROPER WATER FLOW, WATER PRE-TREATMENT, MISUSE OR IMPROPER OPERATION OF THIS DEVICE WILL VOID THE MANUFACTURER'S WARRANTY.

CAUTION: FAILURE TO FOLLOW ALL INSTRUCTIONS MAY RESULT IN DAMAGE TO EQUIPMENT OR PERSONAL INJURY.



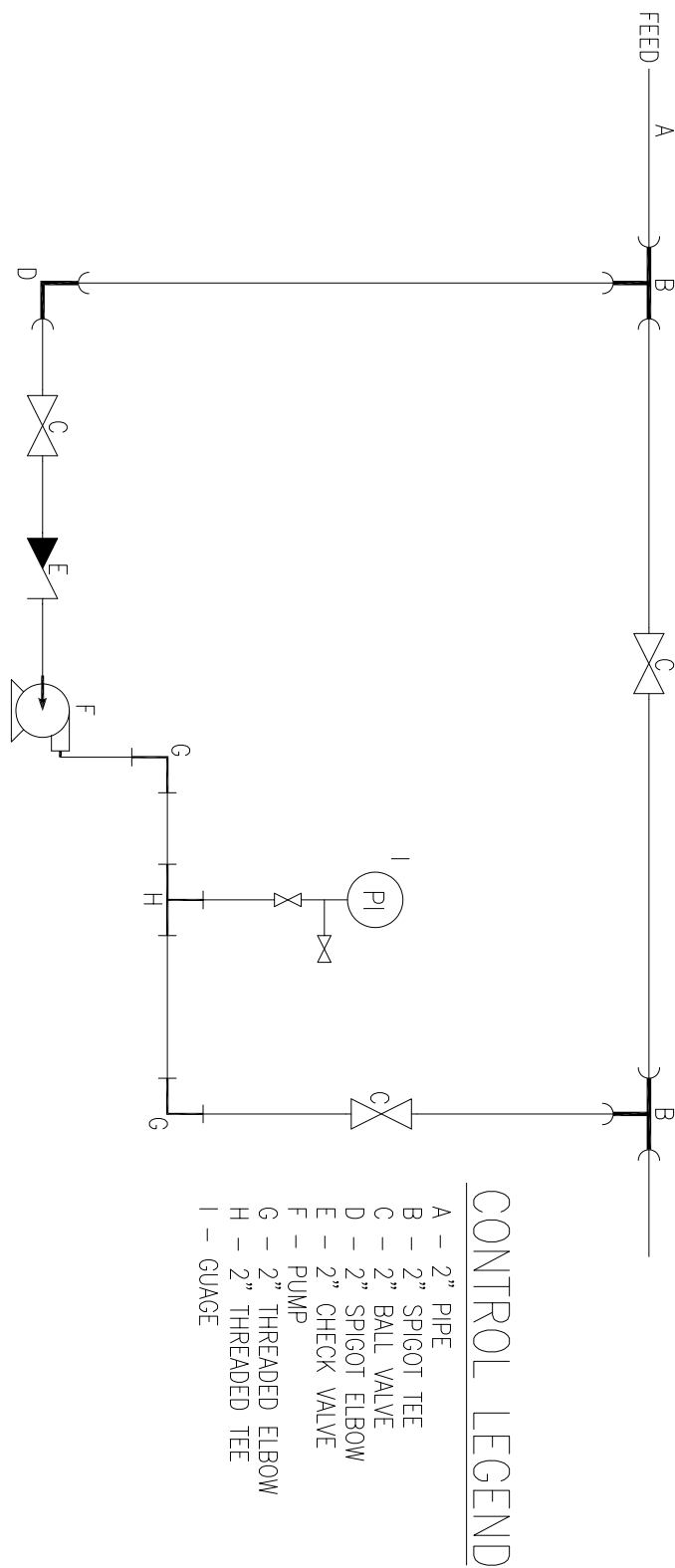
SYSTEM OVERVIEW

National Pride Equipment has developed and manufactured a proprietary Booster Pump to provide a strong pressure and flow from your main water source to provide the best wash possible for your customers and your wash.

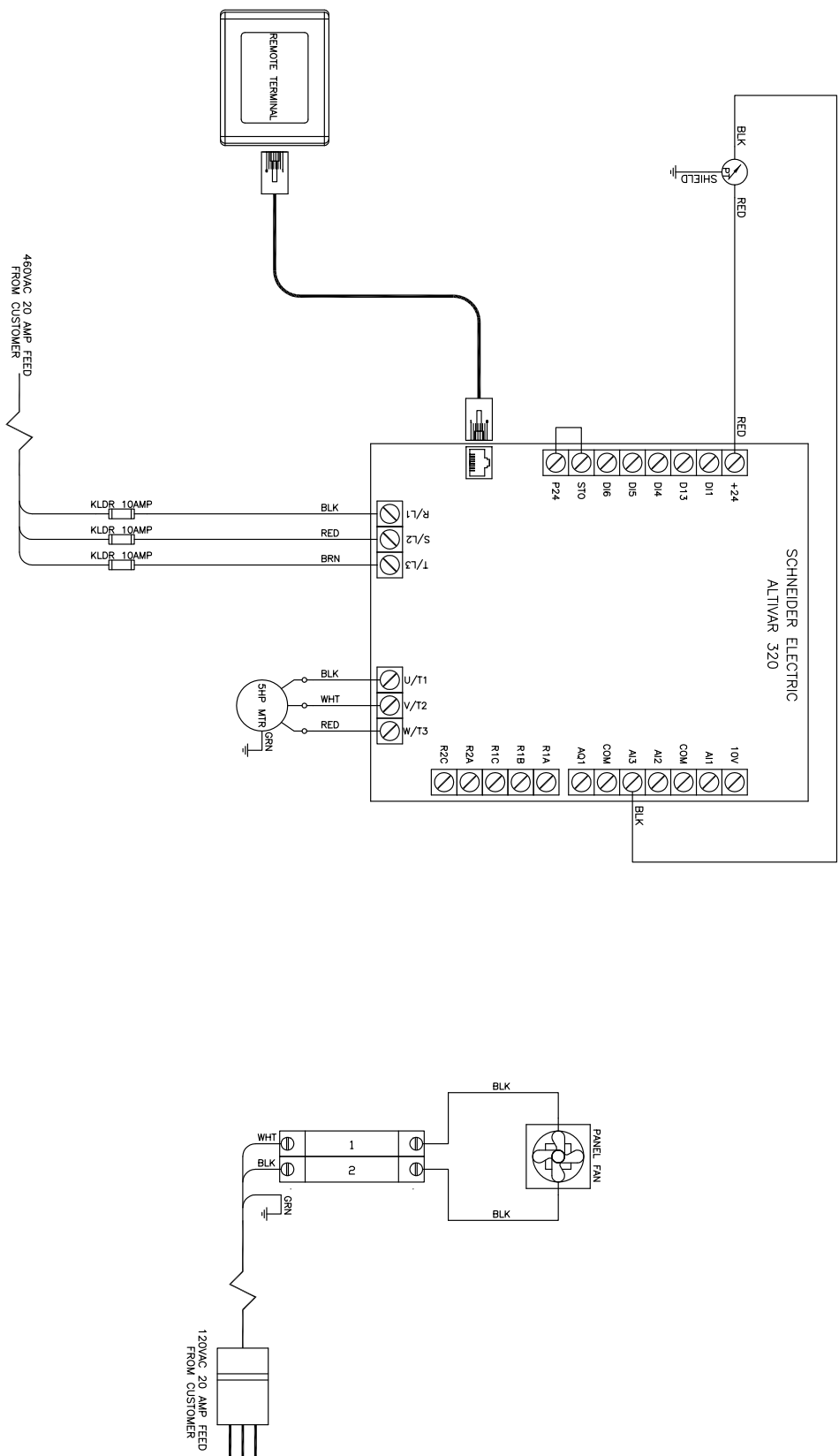
This Booster Pump has been manufactured to readily supply your car wash with the pressure and water needed at all of your bays and tunnels by using a determined pressure that will get the water to its desired source.

Please review the entire Manual prior to installation, start-up, servicing or operating the Booster Pump. This manual will include step by step instructions, general overview, replacement parts for the system and overall guidelines.

BOOSTER PUMP LAYOUT



BOOSTER PUMP ELECTRICAL LAYOUT



SYSTEM LAYOUT



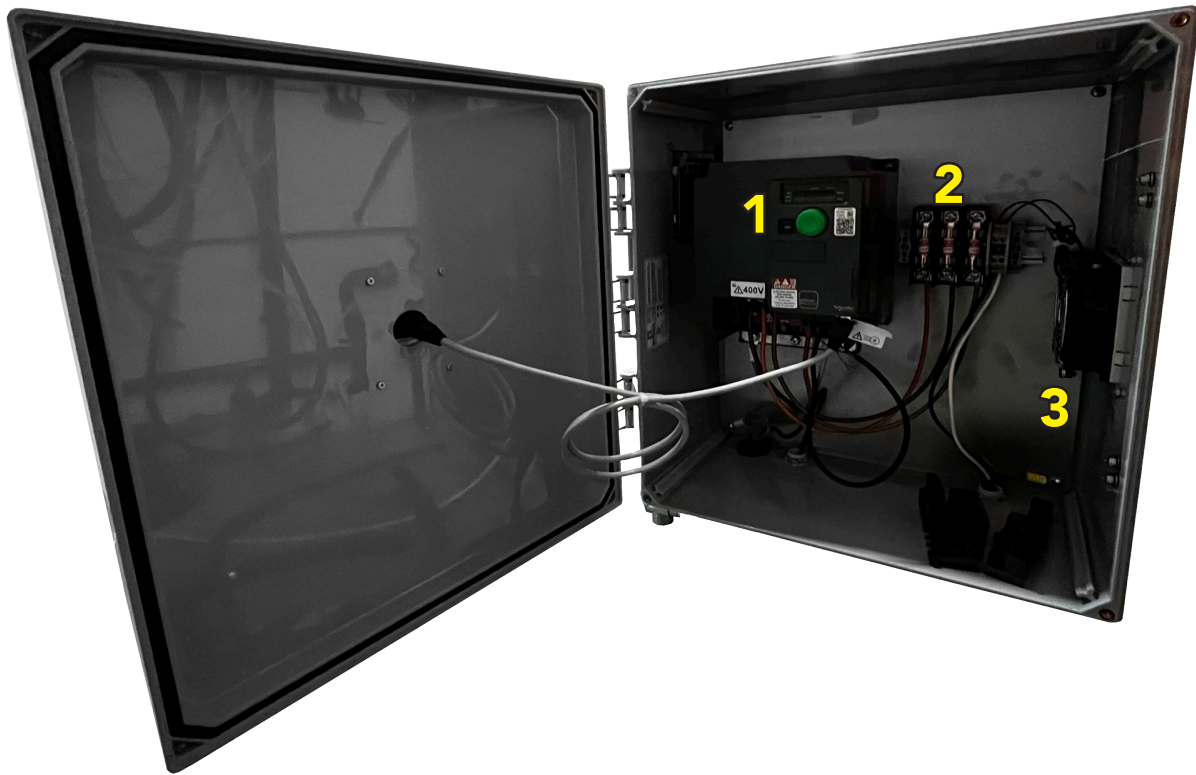
Product Name	Product ID
1. Remote Key Pad	VW3A1007
2. Sta-Rite 5HP 230/460V/3HP	DHJ3-170
3. 2" Check Valve	MM949448
4. Pressure Relief Valve	0760SSPRV75100
5. 2" Union	CU-B4-32
6. Transmitter	628-10-HG-P1-E1-S1

SYSTEM LAYOUT



Product Name	Product ID
1. Outlet Filter	3237060
2. 2" Elbow	C90-B4-32
3. 2" Tee	CT-B4-32
4. Pressure Gauge	GL100R

SYSTEM LAYOUT



Product Name	Product ID
1. VFD	ATV320U40N4C
2. Fuses 10AMP	MCM7714K47
3. Fan	3237100

BOOSTER PUMP FEATURES



BOOSTER PUMP

Always receive constant water pressure, even with fluctuating water volume demands.

NPE's Constant Pressure Systems always ensure turnkey performance.

We always take pride in our equipment and make them to last for a long life in the demanding environments that we are in.

Stabilize Water Pressure

BOOSTER PUMP STANDARD BENEFITS

- Maximum corrosion resistance
- Built to be easily accessible for usage and maintenance
- System monitoring and digital feedback
- Created for your car wash for best performance available

STANDARD FEATURES

APPLICATIONS

Constant water pressure regardless of water volume demands up to 140 GPM @ 60 psi.

FRAME & ENCLOSURE

Stainless steel frame for durability & strength.
Metal enclosure includes vent for heat dissipation.

ELECTRICAL

Available in: 208VAC-230/240VAC 3PH
460/480VAC 3PH

PUMP INLET & OUTLET

Pump inlet includes a check valve, while the outlet assembly has a union for pump access, a pressure relief valve, a pressure gauge, pressure transducer and a ball valve for serviceability.

BOOSTER PUMP REPLACEMENT PARTS

Product ID #	Product Description
800886	Phoenix End Bracket
3044076	Phoenix T2.5 Term Block
3047167	Phoenix ATP-UT Partition Plate
3237060	Rittal EMC Outlet Filter for 3237
3237100	Rittal Filter Fan 15CFM
0760SSPRV75100	3/4" x 1/2" NPT Stainless Steel Pressure Relief Valve
628-10-GH-P1-E1-S1	Pressure Sensor, Transmitter, Gauge, 0-100 psi , 1/4" Male NPT
90L-1.0S	Barstock Fittings SS 90Dg Eblow 1"
ABP-1614	Back Panel
ALT5308901	1/2" Cord Grip
ALT8113305	Oring for 5308901 Cord Grip
ATV320U40N4C	SQD ATV320 Compact Drip
BU-1.0-12S	Barstock Fittings SS Bushing 1" x 3/4"
BU-1.0-8S	Barstock Fittings SS Bushing 1" x 1/2"
BU-8-4S	Barstock Fittings SS Bushing 1/2" x 1/4"
C90-B4-32	2" Cast Threaded Female Threaded 90 Elbow
CHB-B4-32-16	2" x 1" Cast Threaded Hex Bushing 150
CN107899	120" 14/3 Cord Blk
CR-1.0S	Barstock Fittings SS Cross 1"
CT-B4-32	2" Cast Threaded Female Threaded Tee
CU-B4-32	2" Cast Threaded Female Threaded Union
D-9001	Control Center Decal
D-ETL	ETL Decal
DHJ3-170	Sta-Rite - 5HP 230/460V/3PH/60HZ
GL100R	Pressure Gauge Liquid Filled 1/4" Rear Mount
H161407HFLL	16 x 14 Enclosure
HB-16S	SS Hose Bard 1" Tube x 1" MPT
HG300-16B	Goodyear/Continental Contitech 1" Pilovic
HN-1.0S	Barstock Fittings SS Hex Nipple 1"
HN-4S	Barstock Fittings SS Hex Nipple 1/4"
MCM69915K55	3/4" Cord Grip
MCM7008K85	3/4" Cord Grip 90 Degree
MCM7513K241	1/2" Cord Grip Conduit Locknut

BOOSTER PUMP WARRANTY

National Pride Equipment Booster Pump

National Pride Equipment warrants to the original consumer / purchaser against defects in material and/or workmanship from the date of original Manufacture as follows:

Limited Warranty, covering materials and workmanship for 1 year from the date of installation, subject to user's to compliance with manufacturers operating and maintenance instructions.

National Pride Equipment shall not be held liable for any special, incidental or consequential damages, and will at its option, repair or replace any defective components.

Any parts used for replacement are warranted for the remainder of the original warranty period.
THIS WARRANTY DOES NOT COVER DEFECTS CAUSED BY ACCIDENT, FIRE, FLOOD,
ACTS OF GOD, MISUSE, MISAPPLICATION OR NEGLIGENCE.

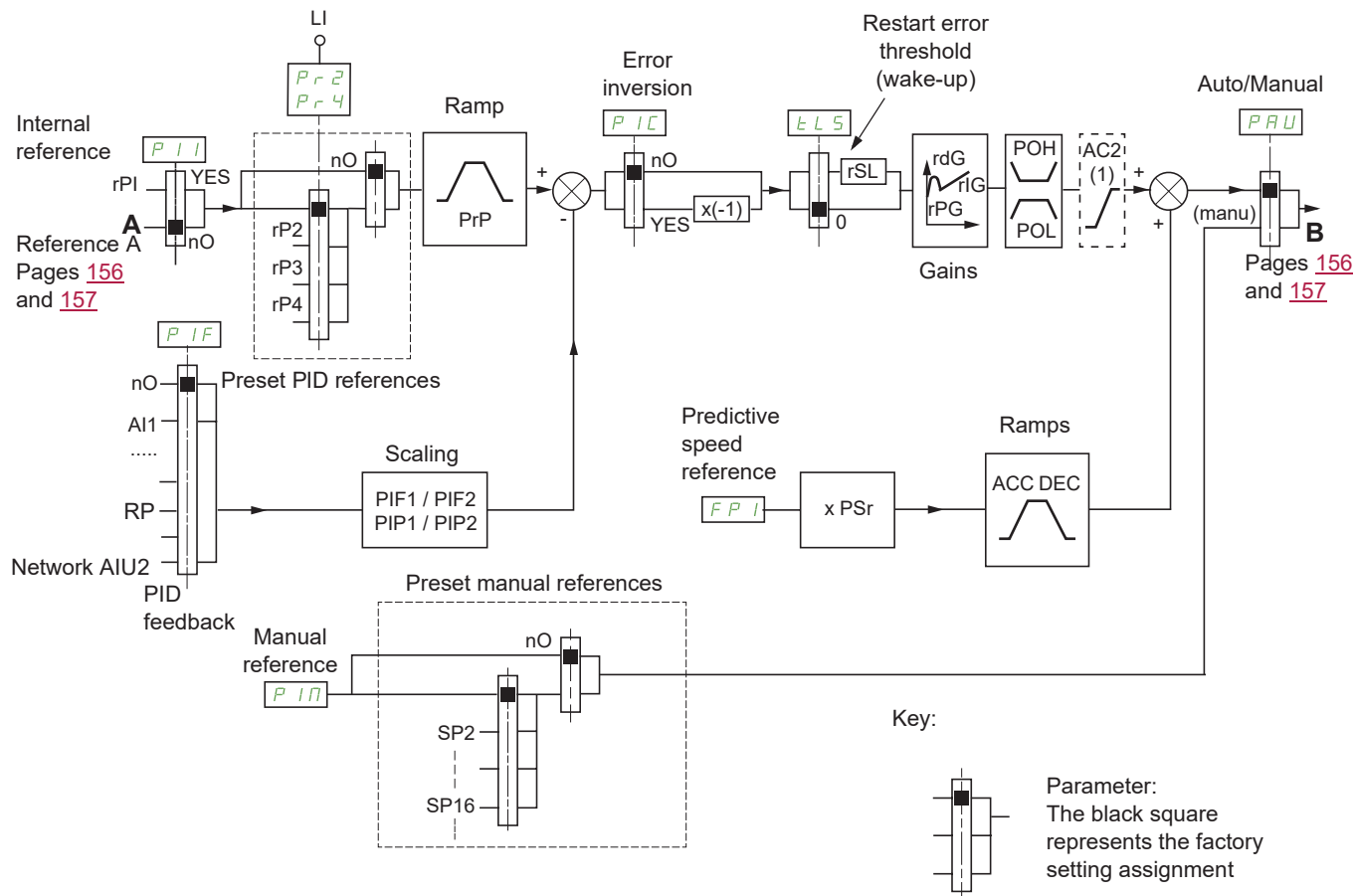
Shipping expenses to National Pride Equipment at 905 Hickory Lane, Mansfield, Ohio 44905 are the responsibility of the consumer. National Pride Equipment will ship the repaired or new component at the consumer's expense and will not be responsible for any labor charges or other costs resulting from the removal or installation of the repaired or replaced part.



PID REGULATOR

Block diagram

The function is activated by assigning an analog input to the PID feedback (measurement).



(1) Ramp AC2 is only active when the PID function starts up and during PID "wake-ups".

PID feedback:

The PID feedback must be assigned to one of the analog inputs AI1 to AI3, to the pulse input, according to whether any extension cards have been inserted.

PID reference:

The PID reference must be assigned to the following parameters: Preset references via logic inputs ($\hat{e} mO$, $\hat{e} mP$, $\hat{e} mQ$)

In accordance with the configuration of [Act. internal PID ref.] ($m f f$) page 222:

Internal reference ($\hat{e} m f$) or

Reference A ([Ref.1 channel] ($c \hat{e} N$) or [Ref.1B channel] ($c \hat{e} N \ddot{A}$), see page 163).

Combination table for preset PID references:

LI ($m \hat{e} Q$)	LI ($m \hat{e} O$)	$m \hat{e} O = \hat{a} 1$	Reference
			rPI or A
0	0		rPI or A
0	1		rP2
1	0		rP3
1	1		rP4

A predictive speed reference can be used to initialize the speed on restarting the process.

Scaling of feedback and references:

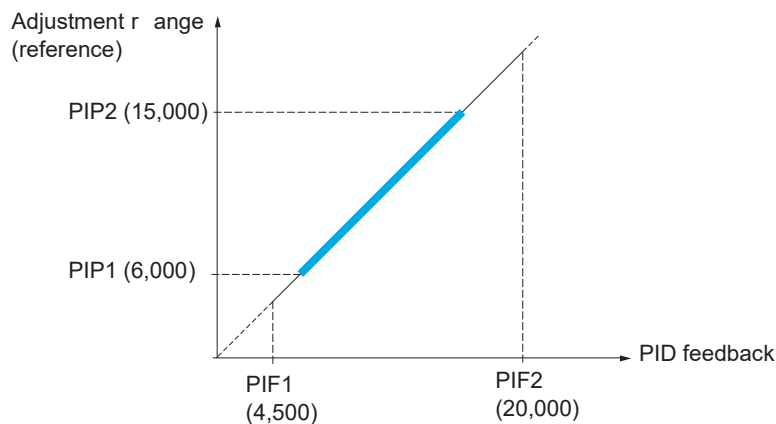
- **[Min PID feedback] (mf c N)**, **[Max PID feedback] (mf c O)** parameters can be used to scale the PID feedback (sensor range). **This scale MUST be maintained for all other parameters.**
- **[Min PID reference] (mf mN)**, **[Max PID reference] (mf mO)** parameters can be used to scale the adjustment range, for example the reference. **The adjustment range MUST remain within the sensor range.**

The maximum value of the scaling parameters is 32,767. To facilitate installation, we recommend using values as close as possible to this maximum level, while retaining powers of 10 in relation to the actual values.

Example (see graph below): Adjustment of the volume in a tank, between 6 m³ and 15 m³.

- Sensor used 4-20 mA, 4.5 m³ for 4 mA and 20 m³ for 20 mA, with the result that **mf c N** = 4,500 and **mf c O** = 20,000.
- Adjustment range 6 to 15 m³, with the result that **mf mN** = 6,000 (min. reference) and **mf mO** = 15,000 (max. reference).
- Example references:
 - rP1 (internal reference) = 9,500
 - rP2 (preset reference) = 6,500
 - rP3 (preset reference) = 8,000
 - rP4 (preset reference) = 11,200

The **[3.4 DISPLAY CONFIG.]** menu can be used to customize the name of the unit displayed and its format.



Other parameters:

- **[PID wake up thresh.] (ê p i)** parameter: Can be used to set the PID error threshold, above which the PID regulator will be reactivated (wake-up) after a stop due to the max. time threshold being exceeded at low speed **[Low speed time out] (i i p)**.
- Reversal of the direction of correction **[PID correct. reverse] (mf ` )**: If **[PID correct. reverse] (mf `)** is set to **[No] (â 1)**, the speed of the motor will increase when the error is positive (for example: pressure control with a compressor). If **[PID correct. reverse] (mf `)** is set to **[Yes] (v b p)**, the speed of the motor will decrease when the error is positive (for example: temperature control using a cooling fan).
- The integral gain may be short-circuited by a logic input.
- An alarm on the PID feedback may be configured and indicated by a logic output.
- An alarm on the PID error may be configured and indicated by a logic output.

"Manual - Automatic" Operation with PID

This function combines the PID regulator, the preset speeds and a manual reference. Depending on the state of the logic input, the speed reference is given by the preset speeds or by a manual reference input via the PID function.

Manual reference [Manual reference] (mf j):

- Analog inputs AI1 to AI3
- Pulse input

Predictive speed reference [Speed ref. assign.] (c mf):

- [AI1] (^ f N): Analog input
- [AI2] (^ f O): Analog input
- [AI3] (^ f P): Analog input
- [RP] (mf): Pulse input
- [HMI] (i ` `): Graphic display terminal or remote display terminal
- [Modbus] (j Ç Ä): Integrated Modbus
- [CANopen] (^ â): Integrated CANopen®
- [Com. card] (â b í): Communication card (if inserted)

Setting up the PID regulator

1. Configuration in PID mode.

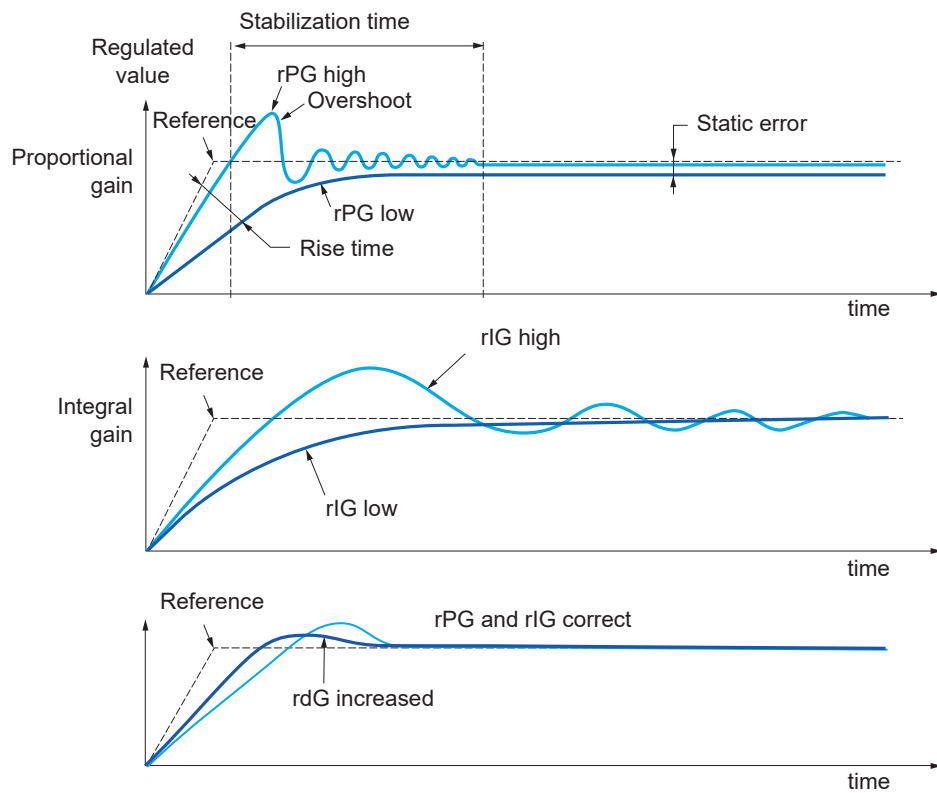
See the diagram on page [218](#).

2. Perform a test in factory settings mode.

To optimize the drive, adjust [PID prop. gain] (ê md) or [PID integral gain] (ê f d) gradually and independently, and observe the effect on the PID feedback in relation to the reference.

3. If the factory settings are unstable or the reference is incorrect.

- Perform a test with a speed reference in Manual mode (without PID regulator) and with the drive on load for the speed range of the system:
 - In steady state, the speed must be stable and comply with the reference, and the PID feedback signal must be stable.
 - In transient state, the speed must follow the ramp and stabilize quickly, and the PID feedback must follow the speed. If this is not the case, see the settings for the drive and/or sensor signal and wiring.
- Switch to PID mode.
- Set [Dec ramp adapt.] (Ä ê ^) to [No] (â 1) (no auto-adaptation of the ramp).
- Set [PID ramp] (mê m) to the minimum permitted by the mechanism without triggering an [Overbraking] (l Ä c).
- Set the integral gain [PID integral gain] (ê f d) to minimum.
- Leave the derivative gain [PID derivative gain] (ê Ç d) at 0.
- Observe the PID feedback and the reference.
- Switch the drive ON/OFF a number of times or vary the load or reference rapidly a number of times.
- Set the proportional gain [PID prop. gain] (ê md) in order to ascertain the compromise between response time and stability in transient phases (slight overshoot and 1 to 2 oscillations before stabilizing).
- If the reference varies from the preset value in steady state, gradually increase the integral gain [PID integral gain] (ê f d), reduce the proportional gain [PID prop. gain] (ê md) in the event of instability (pump applications), find a compromise between response time and static precision (see diagram).
- Lastly, the derivative gain may permit the overshoot to be reduced and the response time to be improved, although this will be more difficult to obtain a compromise in terms of stability, as it depends on 3 gains.
- Perform in-production tests over the whole reference range.



The oscillation frequency depends on the system kinematics.

Parameter	Rise time	Overshoot	Stabilization time	Static error
rPG ↑	↘ ↘	↗	=	↘
rIG ↑	↘	↗ ↗	↗	↘ ↘
rdG ↑	=	↘	↘	=

Code	Name / Description	Adjustment range	Factory setting
F U n -	[APPLICATION FUNCT.] (continued)		
P I d -	[PID REGULATOR]		
	Note: This function cannot be used with certain other functions. Follow the instructions on page 172.		
P I F n O A 1 1 A 1 2 A 1 3 P I A I U 1 A I U 2 O A 0 1 ... O A 1 0	[PID feedback ass.] [No] (n O): Not assigned [AI1] (A 1 1): Analog input A1 [AI2] (A 1 2): Analog input A2 [AI3] (A 1 3): Analog input A3 [RP] (P I): Pulse input [AI virtual 1] (A I U 1): Virtual analog input 1 by the communication bus [AI virtual 2] (A I U 2): Virtual analog input 2 by the communication bus [OA01] (O A 0 1): Function blocks: Analog Output 01 ... [OA10] (O A 1 0): Function blocks: Analog Output 10		[No] (n O)
A I C 2 g n O M d b C A n n E t	[AI2 net. channel] This parameter can be accessed if [PID feedback ass.] (P I F) is set to [AI virtual 2] (A I U 2). This parameter can also be accessed in the [INPUTS / OUTPUTS CFG] (I _ O -) menu. [No] (n O): Not assigned [Modbus] (M d b): Integrated Modbus [CANopen] (C A n): Integrated CANopen® [Com. card] (n E t): Communication card (if inserted)		[No] (n O)
P I F 1 g () (1)	[Min PID feedback] Value for minimum feedback.	0 to [Max PID feedback] (P I F 2) (2)	100
P I F 2 g () (1)	[Max PID feedback] Value for maximum feedback.	[Min PID feedback] (P I F 1) to 32,767 (2)	1,000
P I P 1 g () (1)	[Min PID reference] Minimum process value.	[Min PID feedback] (P I F 1) to [Max PID reference] (P I P 2) (2)	150
P I P 2 g () (1)	[Max PID reference] Maximum process value.	[Min PID reference] (P I P 1) to [Max PID feedback] (P I F 2) (2)	900
P I I g n O Y E S	[Act. internal PID ref.] Internal PID regulator reference. [No] (n O): The PID regulator reference is given by [Ref.1 channel] (F r 1) or [Ref.1B channel] (F r 1 b) with summing/subtraction/multiplication functions (see the diagram on page 218). [Yes] (Y E S): The PID regulator reference is internal via [Internal PID ref.] (r P I).		[No] (n O)

Code	Name / Description	Adjustment range	Factory setting
r P I g 	[Internal PID ref.] Internal PID regulator reference. This parameter can also be accessed in the [1.2 MONITORING] (MOn -) menu.	[Min PID reference] (P I P 1) to [Max PID reference] (P I P 2)	150
r P G g 	[PID prop. gain] Proportional gain.	0.01 to 100	1
r I G g 	[PID integral gain] Integral gain.	0.01 to 100	1
r d G g 	[PID derivative gain] Derivative gain.	0.00 to 100	0
P r P g  (1)	[PID ramp] PID acceleration/deceleration ramp, defined to go from [Min PID reference] (P I P 1) to [Max PID reference] (P I P 2) and vice versa.	0 to 99.9 s	0 s
P I C g n O Y E S	[PID correct. reverse] Reversal of the direction of correction [PID correct. reverse] (P I C) : If [PID correct. reverse] (P I C) is set to [No] (n O) , the speed of the motor will increase when the error is positive (example: pressure control with a compressor) If [PID correct. reverse] (P I C) is set to [Yes] (Y E S) , the speed of the motor will decrease when the error is positive (example: temperature control using a cooling fan). [No] (n O) : No [Yes] (Y E S) : Yes		[No] (n O)
P O L g  (1)	[Min PID output] Minimum value of regulator output in Hz.	- 599 to 599 Hz	0 Hz
P O H g  (1)	[Max PID output] Maximum value of regulator output in Hz.	0 to 599 Hz	60 Hz
P A L g  (1)	[Min fbk alarm] Minimum monitoring threshold for regulator feedback.	[Min PID feedback] (P I F 1) to [Max PID feedback] (P I F 2) (2)	100

Code	Name / Description	Adjustment range	Factory setting
r P I g 	[Internal PID ref.] Internal PID regulator reference. This parameter can also be accessed in the [1.2 MONITORING] (MOn -) menu.	[Min PID reference] (P I P 1) to [Max PID reference] (P I P 2)	150
r P G g 	[PID prop. gain] Proportional gain.	0.01 to 100	1
r I G g 	[PID integral gain] Integral gain.	0.01 to 100	1
r d G g 	[PID derivative gain] Derivative gain.	0.00 to 100	0
P r P g  (1)	[PID ramp] PID acceleration/deceleration ramp, defined to go from [Min PID reference] (P I P 1) to [Max PID reference] (P I P 2) and vice versa.	0 to 99.9 s	0 s
P I C g n O Y E S	[PID correct. reverse] Reversal of the direction of correction [PID correct. reverse] (P I C) : If [PID correct. reverse] (P I C) is set to [No] (n O) , the speed of the motor will increase when the error is positive (example: pressure control with a compressor) If [PID correct. reverse] (P I C) is set to [Yes] (Y E S) , the speed of the motor will decrease when the error is positive (example: temperature control using a cooling fan). [No] (n O) : No [Yes] (Y E S) : Yes		[No] (n O)
P O L g  (1)	[Min PID output] Minimum value of regulator output in Hz.	- 599 to 599 Hz	0 Hz
P O H g  (1)	[Max PID output] Maximum value of regulator output in Hz.	0 to 599 Hz	60 Hz
P A L g  (1)	[Min fbk alarm] Minimum monitoring threshold for regulator feedback.	[Min PID feedback] (P I F 1) to [Max PID feedback] (P I F 2) (2)	100

Code	Name / Description	Adjustment range	Factory setting
P I M g n O A I 1 A I 2 A I 3 P I A I U 1 OA 0 1 ... OA 1 0	[Manual reference] Manual speed input. This parameter can be accessed if [Auto/Manual assign.] (P A U) is not set to [No] (n O) . The preset speeds are active on the manual reference if they have been configured. [No] (n O) : Not assigned [AI1] (A I 1) : Analog input A1 [AI2] (A I 2) : Analog input A2 [AI3] (A I 3) : Analog input A3 [RP] (P I) : Pulse input [AI virtual 1] (A I U 1) : Virtual analog input 1 with the jog dial [OA01] (OA 0 1) : Function blocks: Analog Output 01 ... [OA10] (OA 1 0) : Function blocks: Analog Output 10		[No] (n O)
t L S  (1)	[Low speed time out] Maximum operating time at [Low speed] (L S P) (see [Low speed] (L S P) page 96). Following operation at [Low speed] (L S P) for a defined period, a motor stop is requested automatically. The motor will restart if the reference is greater than [Low speed] (L S P) and if a run command is still present. Note : A value of 0 indicates an unlimited period of time. If [Low speed time out] (t L S) is not 0, [Type of stop] (S t t) page 182 is forced to [Ramp stop] (r M P) (only if a ramp stop can be configured).	0 to 999.9 s	0 s
r S L g  2 s	[PID wake up thresh.]  WARNING UNANTICIPATED EQUIPMENT OPERATION Verify that activating this function does not result in unsafe conditions. Failure to follow these instructions can result in death, serious injury, or equipment damage. If the "PID" and "Low speed operating time" [Low speed time out] (t L S) functions are configured at the same time, the PID regulator may attempt to set a speed lower than [Low speed] (L S P). This results in unsatisfactory operation, which consists of starting, operating at low speed then stopping, and so on... Parameter [PID wake up thresh.] (r S L) (restart error threshold) can be used to set a minimum PID error threshold for restarting after a stop at prolonged [Low speed] (L S P). [PID wake up thresh.] (r S L) is a percentage of the PID error (value depends on [Min PID feedback] (P I F 1) and [Max PID feedback] (P I F 2), see [Min PID feedback] (P I F 1) page 222). The function is inactive if [Low speed time out] (t L S) = 0 or if [PID wake up thresh.] (r S L) = 0.	0.0 to 100.0	0

(1) The parameter can also be accessed in the **[SETTINGS] (S E t -)** menu.

(2) If a graphic display terminal is not in use, values greater than 9,999 will be displayed on the 4-digit display with a period mark after the thousand digit, for example, 15.65 for 15,650.

(3) Range 0.01 to 99.99 s or 0.1 to 999.9 s or 1 to 6,000 s according to **[Ramp increment] (I n r)** page 179.



These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.



Parameter that can be modified during operation or when stopped.



To change the assignment of this parameter, press the ENT key for 2 s.

PID PRESET REFERENCES

Code	Name / Description	Adjustment range	Factory setting
F U n -	[APPLICATION FUNCT.] (continued)		
P r l -	[PID PRESET REFERENCES] Function can be accessed if [PID feedback ass.] (P I F) page 222 is assigned.		
P r 2 n O L I 1 ...	[2 preset PID ref.] If the assigned input or bit is at 0, the function is inactive. If the assigned input or bit is at 1, the function is active. [No] (n O) : Not assigned [LI1] (L I 1) : Logical input LI1 [...] (...): See the assignment conditions on page 162		[No] (n O)
P r 4	[4 preset PID ref.] Check that [2 preset PID ref.] (P r 2) has been assigned before assigning this function. Identical to [2 preset PID ref.] (P r 2) page 224 . If the assigned input or bit is at 0, the function is inactive. If the assigned input or bit is at 1, the function is active.		[No] (n O)
r P 2 g () (1)	[Preset ref. PID 2] This parameter can be accessed if [2 preset PID ref.2] (P r 2) is assigned.	[Min PID reference] (P I P 1) to [Max PID reference] (P I P 2) (2)	300
r P 3 g () (1)	[Preset ref. PID 3] This parameter can be accessed if [3 preset PID ref.] (P r 3) is assigned.	[Min PID reference] (P I P 1) to [Max PID reference] (P I P 2) (2)	600
r P 4 g () (1)	[Preset ref. PID 4] This parameter can be accessed if [4 preset PID ref.] (P r 4) is assigned.	[Min PID reference] (P I P 1) to [Max PID reference] (P I P 2) (2)	900

(1) The parameter can also be accessed in the **[SETTINGS] (S E t -)** menu.

(2) If a graphic display terminal is not in use, values greater than 9,999 will be displayed on the 4-digit display with a period mark after the thousand digit, for example, 15.65 for 15,650.

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These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.

()

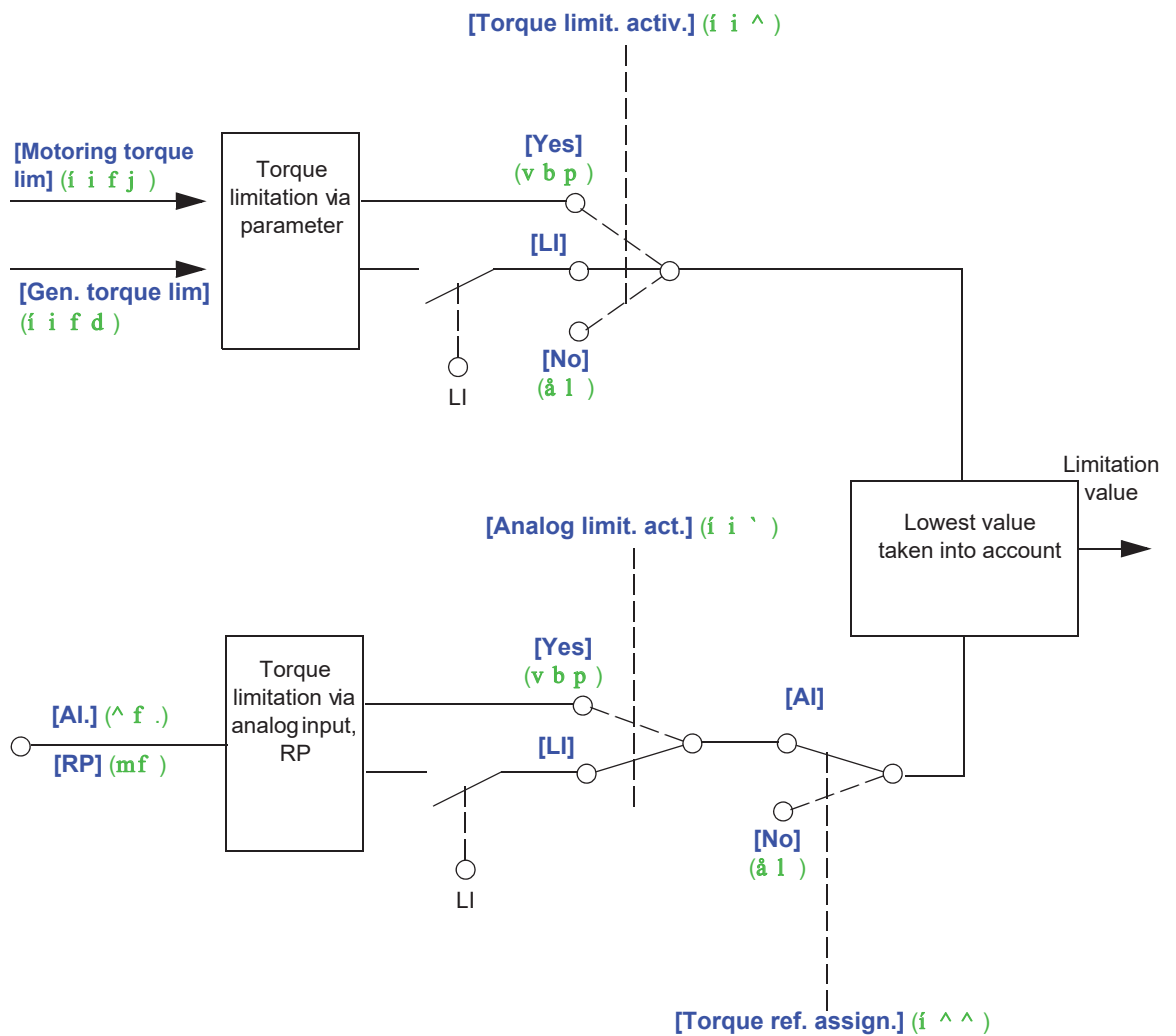
Parameter that can be modified during operation or when stopped.

TORQUE LIMITATION

There are two types of torque limitation:

- With a value that is fixed by a parameter
- With a value that is set by an analog input (AI or pulse)

If both types are enabled, the lowest value is taken into account. The two types of limitation can be configured or switched remotely using a logic input or via the communication bus.



Code	Name / Description	Adjustment range	Factory setting
F U n -	[APPLICATION FUNCT.] (continued)		
t O L -	[TORQUE LIMITATION]		
t L A n O Y E S L I 1 ...	[Torque limit. activ.] If the assigned input or bit is at 0, the function is inactive. If the assigned input or bit is at 1, the function is active. [No] (n O) : Function inactive [Yes] (Y E S) : Function always active [LI1] (L I 1) : Logical input LI1 [...] (...) : See the assignment conditions on page 162		[No] (n O)
I n t P g 0.1 1	[Torque increment] This parameter cannot be accessed if [Torque limit. activ.] (t L A) is set to [No] (n O) . Selection of units for the [Motoring torque lim] (t L I M) and [Gen. torque lim] (t L I G) parameters. [0,1%] (0.1) : Unit 0.1% [1%] (1) : Unit 1%		[1%] (1)
t L I M g () (1)	[Motoring torque lim] This parameter cannot be accessed if [Torque limit. activ.] (t L A) is set to [No] (n O) . Torque limitation in motor mode, as a % or in 0.1% increments of the rated torque in accordance with the [Torque increment] (I n t P) parameter.	0 to 300%	100%
t L I G g () (1)	[Gen. torque lim] This parameter cannot be accessed if [Torque limit. activ.] (t L A) is set to [No] (n O) . Torque limitation in generator mode, as a % or in 0.1% increments of the rated torque in accordance with the [Torque increment] (I n t P) parameter.	0 to 300%	100%
t A A n O A I 1 A I 2 A I 3 P I A I U 1 A I U 2 O A 0 1 ... O A 1 0	[Torque ref. assign.] If the function is assigned, the limitation varies between 0% and 300% of the rated torque on the basis of the 0% to 100% signal applied to the assigned input. Examples: 12 mA on a 4-20 mA input results in limitation to 150% of the rated torque. 2.5 V on a 10 V input results in 75% of the rated torque. [No] (n O) : Not assigned (function inactive) [AI1] (A I 1) : Analog input [AI2] (A I 2) : Analog input [AI3] (A I 3) : Analog input [RP] (P I) : Pulse input [AI Virtual 1] (A I U 1) : Virtual analog input 1 with the jog dial [AI Virtual 2] (A I U 2) : Virtual input via communication bus, to be configured via [AI2 net. channel] (A I C 2) page 143 . [OA01] (O A 0 1) : Function blocks: Analog Output 01 ... [OA10] (O A 1 0) : Function blocks: Analog Output 10		[No] (n O)

Parameters described in this page can be accessed by:

DRI- > CONF > FULL > FUN- > TOL-

Code	Name / Description	Adjustment range	Factory setting
f i `	[Analog limit. act.] This parameter cannot be accessed if [Torque limit. activ.] (f i ^) is set to [No] (ã 1). Identical to [Torque limit. activ.] (f i ^) page 228.		[Yes] (v b p)
Ö	If the assigned input or bit is at 0: The limitation is specified by the [Motoring torque lim] (i i f j) and [Gen. torque lim.] (i i f d) parameters if [Torque limit. activ.] (f i ^) is not [No] (ã 1). No limitation if [Torque limit. activ.] (f i ^) is set to [No] (ã 1). If the assigned input or bit is at 1: The limitation depends on the input assigned by [Torque ref. assign.] (i ^ ^). Note: If [Torque limitation] (f i ^) and [Torque ref. assign.] (i ^ ^) are enabled at the same time, the lowest value will be taken into account.		

(1) The parameter can also be accessed in the **[SETTINGS]** (p b f J) menu.



These parameters only appear if the corresponding function has been selected in another menu. When the parameters can also be accessed and adjusted from within the configuration menu for the corresponding function, their description is detailed in these menus, on the pages indicated, to aid programming.



Parameter that can be modified during operation or when stopped.



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